Effects of Interactive Versus Non-Interactive Communication

A Senior Honors Thesis

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by

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Abstract: *Companies and organizations frequently send communications in both electronic and hard copy format. This duplication would be unnecessary if one method was shown to be superior to the other. This thesis displays strong benefits for using interactive electronic communication rather than non-interactive forms, including hard copy and static correspondence. Participants viewed eight advertisements (two non-interactive advertisements that were measured as non-arousing, two interactive advertisements that were measured as non-arousing, two non-interactive advertisements that were measured as arousing, and two interactive advertisements that were measured as arousing). Participants' heart rate and skin conductance were measured during the experiment. They then underwent free-recall and recognition tests to measure encoding and storage of information. The results show that participants pay more attention to interactive advertisements and remember them better.*

Keywords: Interactive, non-interactive, advertisements, communication, arousing, non-arousing, attention, arousal, memory, physiological, e-mail

CHAPTER 1

INTRODUCTION

Recently companies have been sending both non-interactive ads through the mail, e-mail or Internet, and then sending similar interactive ads through e-mail or the Internet (e.g., Victoria's Secret, American Express). Some of the ads that are sent via e-mail or on Web sites are interactive, so the customer can explore the various products and services. Some of the ads are identical to print ads, in that they are non-interactive and do not allow the customer to communicate directly with the company or its products and services. This raises the question of why a company would invest in both types of ads, which often reach the same customer twice. Is one type of ad more engaging or arousing, and thereby more memorable, than another? Does one make the customer remember the company more than the other? Furthermore, can these questions reasonably be addressed by social scientific theories of cognition and persuasion? Initial research suggests interactivity affects different audiences differently. Interactivity served to increase information processing in participants with low need for cognition; and for those with high need for cognition, it showed relatively little effect (although previous studies suggested this) (Sicilia, Ruiz, & Munuera, 2005).

Empirical research is needed to assess which type of ad is more effective. It is inefficient for companies to spend money or time on both types of ads if one can be shown to be superior in terms of information retained and attitude change. Companies – and public agencies interested in

persuasive communication – should invest their time and resources into the most effective and efficient communication and advertising.

There are practical reasons why companies would consider advertising in multiple media. The digital divide is a reality, wherein citizens of different socio-economic classes have very different access levels to the Internet (Bucy & Newhagen, 2004). Thus, some people do not have access to the Internet or e-mail. Of those people who do have access, some may be leery of interactive advertisements because those people believe that the ads contain viruses or use spyware. However, Internet adoption has far outpaced any previous medium (e.g., television and radio), and consumers are quickly becoming more accepting (Belch & Belch, 2004). This suggests that in the near future the majority of consumers are ready for this type of advertising. This research addresses the psychological dimensions of processing these ads and suggests ways to make the ads more memorable and persuasive. The current study is designed to both advance theories of mediated message processing and provide practical advice to industry. In addition to corporations, these findings are relevant to governmental agencies that use the Internet to target people with public health campaigns.

CHAPTER 2

LITERATURE REVIEW

Hypotheses

Several studies have explored the *limited capacity model of mediated message processing* (Lang, 2000), which makes predictions that people allocate cognitive resources to accomplish certain tasks. Certain structural features – such as animation within Web pages (Lang et. al., 2002) – elicit an orienting reflex, which leads to automatic allocation of cognitive resources to the task of encoding. Previous research has shown that mediated messages that are better encoded are better recognized (e.g., Grabe, Lang, & Zhao, 2003). These orienting reflexes, or ORs, are marked by a short-term cardiac deceleration (Graham, 1979). Furthermore, mediated messages that elicit greater attention (i.e., controlled allocation of resources) often show a sustained slowing of heart rate over time (Lang, 1994). Recent research applied the limited-capacity model to pop-up ads, which present sudden and expected changes in the visual field, and found that this type of ad resulted in a sustained deceleration of heart rate (Diao & Sundar, 2004). Interactive ads resemble pop-up ads in the fact that they result in sudden changes of the visual field with a single click.

Thus, according to this previous research, it is predicted that:

H1: Participants will pay greater attention toward interactive ads than non-interactive ads.

In addition to structural features of communication, content also has an effect on attention (Lang, 1990). Therefore, it is predicted that:

H2: Participants will have greater attention toward ads with arousing content than ads with non-arousing content.

Included in the limited capacity model, is the idea that there is a physiological response, arousal. To measure this, researchers use self-reported data and skin conductance measures. Several studies, including that of Simons, Detenber, Cuthbert, et al. (2003), which used the research of (Detenber, Simons, & Bennett, 1998; Simons, Detenber, Reiss, & Shults, 2000; Simons, Detenber, Roedema, & Reiss, 1999), to look at the relationships with images and various physiological responses. They found that images with greater motion, showed an increase in overall arousal and skin conductance responses.

Based upon these studies, and the fact that interactive advertisements would contain more motion, it is predicted that:

H3: Participants will have more physiological arousal while viewing interactive ads than non-interactive ads.

The research also suggested that high-arousal material produces the same effects. Therefore, it is predicted that:

H4: Participants will have greater arousal while viewing ads with arousing content than ads with non-arousing content.

Research studies suggest that if the participant is paying more attention to stimuli, encoding and storage will be occurring (Grabe, Lang, & Zhao, 2003; Basil, 1994). Based upon these suggestions, it is predicted that:

H5: Participants will have greater encoding and storage of interactive ads than non-interactive ads.

Arousing content has also been shown to have an effect on memory (Lang et. al, 2004). It is therefore predicted that:

H6: Participants will have better memory of ads with arousing content than ads with non-arousing content.

CHAPTER 3

METHOD

Participants

Forty-eight participants (34 female, 14 male) were recruited from communication classes at The Ohio State University. Each student received course credit for participation. Average age was 21.2 years old (range 18-30). Three participants declined to provide age information. All 48 participants identified themselves as non-Hispanic. Forty-one of the participants identified themselves as white; one identified as Asian; five identified as black or African American; and one participant identified as having more than one race.

Apparatus

The ads were played from a Dell computer with an Intel Pentium 4 processor through the media lab program. Participants viewed the ads on a Dell 19-inch LCD flat-panel monitor. The ads were run through Media Lab Software. At pre-determined times, the program would send an audio signal that directed the computer to begin data collection. The physiology computer was an IBM compatible computer with a Scientific Solutions Labmaster A/D D/A board. The data were collected with the VPM computer program. Skin conductance was measured using two In Vivo Metric silver/silver chloride electrodes placed on the palm of the non-dominant hand. The electrodes were filled with KY Jelly. The signal then went to a Coulbourn Instruments LabLinc V71-23-series isolated skin conductance coupler. Skin conductance level was recorded 50 times per second throughout the stimulus presentation and scored offline.

A three-electrode electrocardiogram sensor was used to measure heart rate, with one In Vivo Metric silver/silver chloride electrodes electrode being placed on each of the participant's

forearms and the third electrode placed on the non-dominant arm's wrist. Another ground electrode was placed on the non-dominant forearm. These were filled with a cardiac electrode jelly to amplify the signal. This heart rate data was collected with a Coulbourn Instruments V75-01 bioamplifier with bandpass filters and V21-10 dual comparator/window discriminator. Heart rate data were recorded as milliseconds between heart beats and converted offline to heart beats per minute for analysis.

Stimuli

For the purpose of this experiment, attention is defined as focus. Arousal is defined as stimulating responses from the skin and heart. Memory is defined as being able to recall anything about advertisements, recognizing brand names and recognizing product categories. Interactivity is defined as having at least one link on a page to click and view information instantly. The content of the ads was adjusted in accordance with responses to affective pictures (M. M. Bradley et al., 2001).

Ads were created in Microsoft Word and then converted to Macromedia Dreamweaver Web design software. All elements of the ads were made up to avoid pre-existing brand loyalties (e.g., Bradley & Meeds, 2002).

Sixteen ads were constructed: four interactive with arousing content; four interactive with non-arousing content; four non-interactive with arousing content; four non-interactive with non-arousing content. The interactive ads linked to other created pages where participants could find out more information about the product. This was done to make the participant think they were linking to the company Web site as most electronic ads do. The non-interactive ads were identical to the interactive ads, except instead of links to products, it simply listed a Web site that the participant may view in the future. The participants were not allowed to access the Internet

on his or her own during the study to visit the Web site. This was done to make the ads look identical to print ads.

Measurement

In the current study, if there is a sustained deceleration in heart rate, this suggests that the participant is paying attention. If participants have an increase skin conductance, the content has elicited physiological arousal.

Procedure

When the student-participants arrived at the lab, they were briefed and given consent forms to sign. Participants were asked to sit down while they were connected to the physiological recording equipment. The non-dominant hand was cleaned with an alcohol pad. The non-dominant forearm and non-dominant wrist, and dominant forearms were cleaned with distilled water. Then, two sensors were placed on the non-dominant hand; one on the non-dominant wrist to ground the subject; one on the non-dominant forearm; and one on the dominant forearm.

The participants were then again reminded that they would be able to click on some of the ads, but not others.

The students were assigned to one of two counter-balanced orders. They viewed eight ads (two interactive with content that was measured as non-arousing, two interactive with content that was measured as arousing, two non-interactive with content that was measured as arousing, two non-interactive with content that was measured as non-arousing). They viewed each ad for 90 seconds.

Following the ad viewing, participants answered several unrelated verbal comprehension questions lasting approximately 15 minutes to clear short-term memory. Then they underwent a five-minute free recall test that asked them to write down anything that came to mind about the

ads. Following the free recall test, they completed a recognition test that displayed brand names and the product categories of the both the products they viewed and other brands and categories on the market today. The participant indicated whether they had seen the brand name or product category during the ad viewing. These tests assessed encoding and storage for both the verbal and visual content.

CHAPTER 4

RESULTS

Manipulation Check

Because this study employed a subtle manipulation of arousing content, it was important to examine whether the manipulation led to an increase of perceived arousal among participants. The Self Assessment Manikin measures, self-reported data where participants indicated whether they thought the ads were arousing or calm, served as the manipulation check. The manipulation was not successful, $F(1,47) = .28$, $p = .60$. The arousing ads were actually slightly less arousing ($M = 3.52$, $SD = 1.46$) than the calm ads ($M = 3.61$, $SD = 1.30$). The arousing and calm images selected for this study were selected in order to maximize external validity of the study. That is, the images were selected in order to be as similar as possible to images that would be used in actual advertisements. Although more extreme images could have been selected for the study, the resulting ads would have had little resemblance to those used by practitioners. Any findings resulting from such ads would have little relevance to strategic communications practitioners.

It was also of interest to ensure that one category of ads was not more positive or negative than the other. Again, using the SAM measures, there was no difference in valence, $F(1,47) = 1.15$, $p = .29$. Both arousing ($M=5.60$, $SD = .91$) and calm ads ($M = 5.76$, $SD = .90$) were slightly positive on the 9 point scale.

Tests of Hypotheses

Hypothesis 1 predicted the participants would pay greater attention toward interactive ads than non-interactive ads. This hypothesis was tested by examining heart rate over time. Current theory suggests that as participants in a controlled environment allocate more cognitive resources

to an external stimulus, their heart rate slows down (Lang, 1994). Thus, the hypothesis was tested by examining participants' heart rate over time for the interactive and non-interactive ads. As predicted, there was a significant Interactivity × Time interaction, $F(17,799) = 3.41$, $p < .001$, $\eta^2 = .07$.

This interaction is not exactly as expected, however. As shown in Figure 1, participants show significantly greater cardiac deceleration during the initial 6 time intervals, which represents 30 seconds; however, after that point, the participants experienced less sustained cardiac deceleration in the interactive condition. This suggests that the presence of interactivity was capable of eliciting greater attention for only a finite period of time. Hypothesis 1 was partially supported.

Hypotheis 2 could not be tested because the arousing content manipulation was not successful.

Hypothesis 3 predicted that participants would have experienced greater physiological arousal while viewing interactive ads than non-interactive ads. To test the hypothesis, the magnitude of the largest skin conductance response and frequency of skin conductance responses were examined. As would be expected given the failed manipulation check, this hypothesis was not supported with either frequency, $F(1,47) = 2.34$, $p = .631$ or magnitude $F(1,47) = .421$, $p=.519$.

Hypothesis 4 could not be tested because the arousing content manipulation was not successful.

Hypothesis 5 predicted that participants would have greater encoding and storage of interactive ads than non-interactive ads. This was tested using free-recall data for storage and recognition data for encoding. The hypothesis was supported with both free recall data, $F(1,47) =$

5.686, $p = .021$, $\eta^2 = .11$, and recognition data, $F(1,47) = 17.625$, $p < .001$, $\eta^2 = .27$. More information was freely recalled about interactive ads ($M = 13.50$, $SD = 9.54$) than non-interactive ads ($M = 10.05$, $SD = 6.06$). Interactive ads were also more likely to be recognized ($M = .95$, $SD = .11$) than non-interactive ads ($M = .82$, $SD = .17$). Thus, it appears that participants were better encoding and storing the interactive ads.

Hypothesis 6 could not be tested because the arousing content manipulation was not successful.

CHAPTER 5

DISCUSSION

This research suggests that interactivity has an effect on both attention and memory. This offers practical information to organizations that are trying to decide whether to send their correspondence via e-mail or regular mail. E-mail is already less expensive than sending material though regular mail, and the data here suggest additional benefits by including interactivity. However, simply sending communication through e-mail or a Web site was not shown to be more effective. Web pages were used in this experiment to simulate both the interactive and non-interactive advertisements. Therefore, simply sending a customer to a static Web page, with no links to click, would not constitute interactive communication. For this research to apply, dynamic Web pages, with links to obtain more information would have to be included.

Despite the benefits of interactive communication, there are still challenges that exist with sending correspondence through e-mail or other links on Web sites. In this study, the participants did not have the option of disregarding the communication altogether as they might do in their everyday lives. Although once the advertisements were open, these participants paid more attention, many people consider communication in their e-mail to be "spam." Although the same holds true to some extent for communication via regular mail, with people considering those to be "junk mail." Additionally, creating the dynamic Web pages necessary for improved attention, encoding, and storage often take more time to create than static hard copy or electronic communication.

Despite these challenges, switching to e-mail could be done for companies with loyal, trusting customers. The same could be true of organizations that send newsletters or other non-advertising forms of communication.

During the viewing of the interactive ads, for the first 30 seconds of viewing, the participants had a sustained deceleration in heart rate, lower than that of the non-interactive ads over the same time period. However, during the final 60 seconds, the participants' heart rates were lower for the non-interactive than the interactive. This is contrary to what one would expect. It seems that participants should be paying more attention to the interactive ads at the end than they would at the end of the non-interactive ads, since it seems they would have been bored with the non-interactive ads. It is not clear why this would occur.

The participants were able to freely recall more information about the products that had interactive advertisements than those that had non-interactive advertisements. Since a primary function of advertising is to get people to remember the product when it comes time to purchase a product, this form is valuable. The same holds true for other forms of communication such as letters, reports, etc., that the sender wants the receiver to encode and store. Not only did the participants freely recall information more information about the products with interactive advertisements, they also recognized the brand names and product categories more often than those with non-interactive advertisements. Again, recognizing a brand, product, or name at decision time is the key to how companies make money, obtain customers and retain customers.

Limitations

For this experiment, the manipulation check using the self-reported data was not successful. Further, there was no difference in physiological arousal either. Although ads were manipulated using IAPS, the most extreme arousing pictures (e.g., blood, sex). were not used

because these are not images that are normally seen in advertisements. Although the subtle manipulation check did not work, there is the potential for arousal to be used. There is a growing body of research that shows that arousal leads to greater memory. Advertisers and other senders would have to reach levels of arousal that would actually make a difference, however. This would include graphic images that some people take offense to, as well as government regulations. Although it would not be appropriate for every company or organization to use these pictures to create arousal, some may find that including more sexual or violent pictures is beneficial.

The interactivity alone did not cause a change in physiological arousal. This suggests that interactivity in online advertisements alone might not be sufficient to elicit physiological arousal. Yet without increased arousal, the increased attention was sufficient to elicit significant differences in memory.

Further Research

Knowing that people will pay more attention if they actually open the communication via e-mail, further research should be done to determine how and why people would open communication in e-mail or on a Web site. This would support this research and make it more valuable to organizations.

This study was designed so that participants would click on links during the interactive advertisements. Because of the design of the study, the interactive advertisements appeared the same as the non-interactive advertisements except they had colored text with words to click to visit different links. Despite the clear instructions and the fact that the pointer changed to a hand over the words, some people were still confused about whether or not they were links to click during certain advertisements. Future studies should try to make the links clearer for students.

This may include putting the words “click here” next to each link, or making students open the advertisements from a fake inbox so they are more in the mindset of an electronic advertisement.

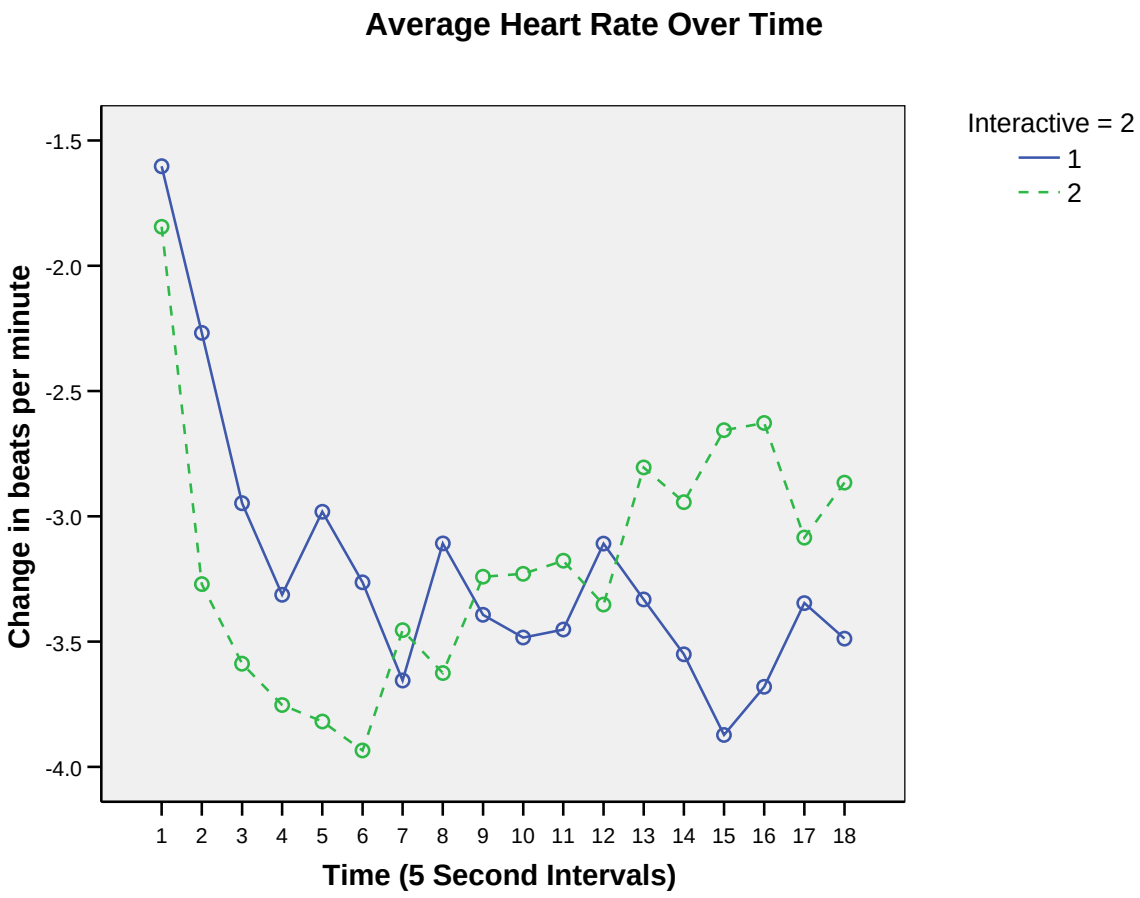
APPENDIX A

RESULTS FIGURES

Figure Caption

Figure 1

Average Change in Heart Rate over Time as a Function of Interactive Advertising Content



APPENDIX B

SAMPLE ADS

Your desk chair just got a little more comfortable.

With the Rujen PDA, you can do all your business from one place.

Features

Prices and Plans

Models

Store locations

Warranty Information

Rujen
Business Everywhere.

Figure 2
Arousing Interactive Ad

Your desk chair just got a little more comfortable.

With the Rujen PDA, you can do all your business from one place.

You need to check email, download files, access the Internet and return calls. All while on-the-go. Now you can be more productive and efficient with Rujen's comprehensive suite of wireless services that offer simple solutions for your most complex business communication needs

To find out what Rujen can do for you and your business, visit www.rujen.com.

Rujen
Business Everywhere.

Figure 3
Arousing Non-Interactive Ad

APPENDIX C

BRAND NAMES,SLOGANS,LOGOS AND PRODUCT CATEGORIES

Brand Name	Logo	Slogan	Product Category
Rujen		Business Everywhere.	PDA
Pangle		Hear the world.	Cell Phone
Menard		Captured.	Digital Camera
Luckive		For every room. For everyone.	Flat Screen/Microwave Combo
Hupsic		Home. School. Work. We're here.	Laptop
Kanden		Nothing else needed.	Stereo
Eclogue		Record.Rewind.Replay.Life	Video Camera
Vitep		Vital for now. Vitep for life	Personal Computer

Figure 4
Brand names, logos, slogans and product categories

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